

WHAT IS CLAIMED IS:

1. A method of producing, in a mammal, antibodies that neutralize severe acute respiratory syndrome (SARS) coronavirus, said method comprising administering to said mammal at least one peptide comprising amino acids 20-51, 83-113, 119-149, 161-188, 171-213, 198-221, 238-273, 265-287, 288-320, 386-417, 424-457, 460-490, 513-546, 539-569, 588-626, 640-674, 753-782, 792-831, 901-939, 1019-1057, 1066-1094, 1121-1153, 1162-1191, 841-882, 843-921, 1127-1161, or 1162-1197 of SARS coronavirus spike protein, or amino acids 23-49, 176-210, 234-267, 276-301, 357-369 or 387-421 of SARS coronavirus N protein, or antigenic fragment thereof, in an amount such that said production is effected.

2. The method according to claim 1 wherein said at least one peptide comprises an amino acid sequence selected from the group consisting of those set forth in SEQ ID NO:1 to SEQ ID NO:27, and antigenic fragments thereof.

3. The method according to claim 1 wherein said at least one peptide comprises an amino acid sequence selected from the group consisting of those set forth in SEQ ID No:28 to SEQ ID No:33, and antigenic fragments thereof.

4. The method according to claim 1 wherein said at least one peptide is at least 5 amino acids in length.

5. The method according to claim 4 wherein said at least one peptide is at least 10 amino acids in length.

6. The method according to claim 1 wherein said at least one peptide comprises at least two copies of amino acids 20-51, 83-113, 119-149, 161-188, 171-213, 198-221, 238-273, 265-287, 288-320, 386-417, 424-457, 460-490, 513-546, 539-569, 588-626, 640-674, 753-782, 792-831, 901-939, 1019-1057, 1066-1094, 1121-1153, 1162-1191, 841-882, 843-921, 1127-1161, or 1162-1197 of SARS coronavirus spike protein, or amino acids 23-49, 176-210, 234-267, 276-301, 357-369 or 387-421 of SARS coronavirus N protein, or antigenic fragment thereof.

7. The method according to claim 1 wherein said at least one peptide comprises at least two different amino acid sequences selected from the group consisting of amino acids 20-51, 83-113, 119-149, 161-188, 171-213, 198-221, 238-273, 265-287, 288-320, 386-417, 424-457, 460-490, 513-546, 539-569, 588-626, 640-674, 753-782, 792-831, 901-939, 1019-1057, 1066-1094, 1121-1153, 1162-1191, 841-882, 843-921, 1127-1161, and 1162-1197 of SARS coronavirus spike protein, and amino acids 23-49, 176-210, 234-267, 276-301, 357-369 and 387-421 of

SARS coronavirus N protein, and antigenic fragments thereof.

8. A method of producing, in a mammal, antibodies that neutralize SARS coronavirus, said method comprising administering to said mammal at least one peptide comprising amino acids 33-40, 148-369, 395-406, 581-712, 779-816, 816-824 or 992-1149 of SARS coronavirus spike protein, or antigenic fragment thereof, in an amount such that said production is effected.

9. A method of producing, in a mammal, antibodies that neutralize SARS coronavirus, said method comprising administering to said mammal at least one peptide comprising HR-1 or HR-2 of SARS coronavirus spike protein, or antigenic fragment thereof, in an amount such that said production is effected.

10. The method according to claim 1, 8 or 9 wherein said administration is effected by administering to said mammal at least one nucleic acid sequence encoding said at least one peptide under conditions such that said nucleic acid is expressed and said peptide is thereby produced.

11. The method according to claim 10 wherein said nucleic acid is operably linked to a promoter.

12. The method according to claim 10 wherein said nucleic acid is present in a vector.

13. The method according to claim 12 wherein said vector is a viral vector.

14. The method according to claim 13 wherein said viral vector is a replicating or non-replicating adenoviral vector, an adeno-associated virus vector, an attenuated mycobacterium tuberculosis vector, a Bacillus Calmette Guerin (BCG) vector, a vaccinia or Modified Vaccinia Ankara (MVA) vector, a recombinant polio virus vector, a Salmonella species bacterial vector, a Shigella species bacterial vector, a Venezuelan Equine Encephalitis Virus (VEE) vector, a Semliki Forest Virus vector, or a Tobacco Mosaic Virus vector.

15. A method of inhibiting fusion of SARS coronavirus to cells of a mammal, said method comprising administering to said mammal at least one peptide comprising HR-1 or HR-2 of SARS coronavirus spike protein, or portion thereof that inhibits said fusion, in an amount sufficient to effect said inhibition.

16. The method according to claim 15 wherein said at least one peptide comprises the amino acid sequence set forth in SEQ ID NO:34 or SEQ ID NO:35, or portion thereof that inhibits said fusion.

17. A composition comprising at least one peptide comprising amino acids 20-51, 83-113, 119-149, 161-188, 171-213, 198-221, 238-273, 265-287, 288-320, 386-417, 424-457, 460-490, 513-546, 539-569, 588-626, 640-674, 753-782, 792-831, 901-939, 1019-1057, 1066-1094, 1121-1153, 1162-1191, 841-882, 843-921, 1127-1161, or 1162-1197 of SARS coronavirus spike protein or amino acids 23-49, 176-210, 234-267, 276-301, 357-369 or 387-421 of SARS coronavirus N protein, or antigenic fragment thereof, and a carrier.

18. The composition according to claim 17 wherein said at least one peptide comprises at least two copies of amino acids 20-51, 83-113, 119-149, 161-188, 171-213, 198-221, 238-273, 265-287, 288-320, 386-417, 424-457, 460-490, 513-546, 539-569, 588-626, 640-674, 753-782, 792-831, 901-939, 1019-1057, 1066-1094, 1121-1153, 1162-1191, 841-882, 843-921, 1127-1161, or 1162-1197 of SARS coronavirus spike protein, or amino acids 23-49, 176-210, 234-267, 276-301, 357-369 or 387-421 of SARS coronavirus N protein, or antigenic fragment thereof.

19. The composition according to claim 17 wherein said at least one peptide comprises at least two different amino acid sequences selected from the group consisting of amino acids 20-51, 83-113, 119-149, 161-188, 171-213, 198-221, 238-273, 265-287, 288-320, 386-417, 424-457, 460-490, 513-546, 539-569, 588-626, 640-674, 753-782, 792-831, 901-939,

1019-1057, 1066-1094, 1121-1153, 1162-1191, 841-882, 843-921, 1127-1161, and 1162-1197 of SARS coronavirus spike protein, and amino acids 23-49, 176-210, 234-267, 276-301, 357-369 and 387-421 of SARS coronavirus N protein, and antigenic fragments thereof.

20. The composition according to claim 17 wherein said composition further comprises an adjuvant.

21. The composition according to claim 17 wherein said composition is sterile.

22. A composition comprising at least one peptide comprising amino acids 33-40, 148-369, 395-406, 581-712, 779-816, 816-824 or 992-1149 of SARS coronavirus spike protein, or antigenic fragment thereof, and a carrier.

23. A composition comprising least one peptide comprising HR-1 or HR-2 of SARS coronavirus spike protein, or antigenic fragment thereof or portion thereof that inhibits fusion, and a carrier.

24. An isolated nucleic acid sequence encoding amino acids 20-51, 83-113, 119-149, 161-188, 171-213, 198-221, 238-273, 265-287, 288-320, 386-417, 424-457, 460-490, 513-546, 539-569, 588-626, 640-674, 753-782, 792-831, 901-939, 1019-1057, 1066-1094, 1121-1153, 1162-1191, 841-882, 843-921, 1127-

1161, or 1162-1197 of SARS coronavirus spike protein, or amino acids 23-49, 176-210, 234-267, 276-301, 357-369 or 387-421 of SARS coronavirus N protein, or antigenic fragments thereof, or complement thereof.

25. An isolated nucleic acid sequence encoding amino acids 33-40, 148-369, 395-406, 581-712, 779-816, 816-824 or 992-1149 of SARS coronavirus spike protein, or antigenic fragment thereof, or complement thereof.

26. An isolated nucleic acid sequence encoding HR-1 or HR-2 of SARS coronavirus spike protein, or antigenic fragment thereof or portion thereof that inhibits fusion, or complement thereof.

27. An antibody, or binding fragment thereof, specific for amino acids 20-51, 83-113, 119-149, 161-188, 171-213, 198-221, 238-273, 265-287, 288-320, 386-417, 424-457, 460-490, 513-546, 539-569, 588-626, 640-674, 753-782, 792-831, 901-939, 1019-1057, 1066-1094, 1121-1153, 1162-1191, 841-882, 843-921, 1127-1161, or 1162-1197 of SARS coronavirus spike protein, or amino acids 23-49, 176-210, 234-267, 276-301, 357-369 or 387-421 of SARS coronavirus N protein, or antigenic fragment thereof.

28. An antibody, or binding fragment thereof, specific for amino acids 33-40, 148-369, 395-406, 581-712, 779-816, 816-824 or 992-1149 of SARS

coronavirus spike protein, or antigenic fragment thereof.

29. An antibody, or binding fragment thereof, specific for HR-1 or HR-2 of SARS coronavirus spike protein, or antigenic fragment thereof.

30. A method of detecting SARS coronavirus protein in a sample comprising contacting said sample with said antibody, or binding fragment thereof, according to claim 27, 28, or 29 under conditions such that said antibody can bind to said protein and detecting the presence of a complex comprising said antibody and said protein.

31. A method of detecting antibodies to SARS coronavirus protein in a sample comprising contacting said sample with at least one peptide comprising an amino acid sequence selected from the group consisting of amino acids 20-51, 83-113, 119-149, 161-188, 171-213, 198-221, 238-273, 265-287, 288-320, 386-417, 424-457, 460-490, 513-546, 539-569, 588-626, 640-674, 753-782, 792-831, 901-939, 1019-1057, 1066-1094, 1121-1153, 1162-1191, 841-882, 843-921, 1127-1161, and 1162-1197 of SARS coronavirus spike protein, and amino acids 23-49, 176-210, 234-267, 276-301, 357-369 and 387-421 of SARS coronavirus N protein, and antigenic fragments thereof, under conditions such that said peptide can bind to said antibodies and detecting the presence



of a complex comprising said antibodies and said peptide.

32. A method of detecting antibodies to SARS coronavirus protein in a sample comprising contacting said sample with at least one peptide comprising an amino acid sequence selected from the group consisting of amino acids 33-40, 148-369, 395-406, 581-712, 779-816, 816-824 or 992-1149 of SARS coronavirus spike protein, and antigenic fragments thereof, under conditions such that said peptide can bind to said antibodies and detecting the presence of a complex comprising said antibodies and said peptide.

33. A method of detecting antibodies to SARS coronavirus protein in a sample comprising contacting said sample with at least one peptide comprising HR-1 or HR-2 of SARS coronavirus spike protein, or antigenic fragment thereof, under conditions such that said peptide can bind to said antibodies and detecting the presence of a complex comprising said antibodies and said peptide.

34. A method of detecting the presence of a SARS coronavirus encoding sequence in a sample comprising contacting said sample with the nucleic acid sequence according to claim 24, 25 or 26, or complement thereof, and detecting the formation of a complex between said nucleic acid sequence, or complement thereof, and said encoding sequence.

35. An isolated peptide comprising an amino acid sequence selected from the group consisting of amino acids 20-51, 83-113, 119-149, 161-188, 171-213, 198-221, 238-273, 265-287, 288-320, 386-417, 424-457, 460-490, 513-546, 539-569, 588-626, 640-674, 753-782, 792-831, 901-939, 1019-1057, 1066-1094, 1121-1153, 1162-1191, 841-882, 843-921, 1127-1161, and 1162-1197 of SARS coronavirus spike protein and amino acids 23-49, 176-210, 234-267, 276-301, 357-369 and 387-421 of SARS coronavirus N protein, and antigenic fragments thereof.

36. The isolated peptide according to claim 35 wherein said peptide comprises an amino acid sequence selected from the group of sequences set forth in SEQ ID NO:1 to SEQ ID:33.

37. An isolated peptide comprising an amino acid sequence selected from the group consisting of amino acids 33-40, 148-369, 395-406, 581-712, 779-816, 816-824 and 992-1149 of SARS coronavirus spike protein, and antigenic fragments thereof.

38. An isolated peptide comprising HR-1 or HR-2 of SARS coronavirus spike protein, or antigenic fragment thereof or portion thereof that inhibits fusion.